

## Malignant Lymphomas in Korea

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*A retrospective histological study of 540 malignant lymphomas diagnosed at the Department of Pathology of the Seoul National University from 1976 through 1986 is presented. Malignant lymphoma is the 10th most common malignant tumor in Korea, comprising 3.07% of all malignancy during period of study.*

*Among malignant lymphomas non-Hodgkin's lymphoma accounted for 82% and accordingly the Hodgkin's disease was for 18%. The most common type of non-Hodgkin's lymphoma was diffuse histiocytic lymphoma of Rappaport. Follicular lymphoma was very rare, comprising only 2.3%. T-cell lymphoma accounted for 9.6% of non-Hodgkin's lymphomas, the most frequent type being lymphoblastic lymphoma. Immunoblastic sarcoma and mycosis fungoides were occasionally seen but there was no case of pleomorphic adult T-cell lymphoma. Among Hodgkin's diseases, mixed cellularity type was the most common type, and nodular sclerosis type was relatively rare.*

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**Key Words:** *Malignant lymphoma, Hodgkin's disease, lymphoid tumor*

### INTRODUCTION

**Histopathologic** study of malignant lymphomas in Korea has not been conducted systematically until 1965, when it was first noted that Hodgkin's disease was a fairly uncommon subtype of the malignant lymphoma (Lee et al., 1965). There have been several reports thereafter indicating a considerable difference in lymphomas in Korea from those in western countries particularly in relative incidence of the subtypes of malignant lymphoma. These reports have consistently shown a much lower incidence of Hodgkin's disease and follicular lymphoma and a much higher incidence of diffuse large

cell lymphoma (reticulum cell sarcoma) (Kim et al., 1973; Lee et al., 1979; Jung et al., 1982).

This communication is a retrospective histological study of malignant lymphomas in Korea, based on materials collected during 11 years in one university hospital.

### MATERIALS AND METHODS

During an 11-years period, from January 1, 1976 to December 31, 1986, there was a total of 540 malignant lymphomas that were examined and diagnosed as malignant lymphoma at the Department of Pathology of Seoul National University Hospital. During this 9 years period from 1978 to 1986 there were 19,140 cases of malignant tumor. Malignant lymphoma accounted for 3.07% of all malignant tumors. It was the 10th most common malignancy for both sexes combined and was the 8th most common

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*This study was supported in part by the Seoul National University Hospital Clinical Research Fund (1987)*

tumor in male.

All the microscopic slides of the cases included in this study were critically reviewed by the authors. When we came across a discrepancy between our opinion and the original diagnosis, the original pathologist was consulted and finalized the diagnosis. There were only a very small number of cases that were excluded from the present study because of the quality of the slides. The diagnosis was almost exclusively based on hematoxylin-eosin stained slides until 1983, and immunohistochemical stains were added in recent years in selected cases. Modified Rappaport classification (Rappaport, 1966) and Lukes-Collins classification (Lukes and Collins, 1975) were adopted to analyze non-Hodgkin's lymphoma and Rye classification (Lukes et al., 1966) for Hodgkin's disease.

## RESULTS

### 1. Non-Hodgkin's Lymphoma (Tables 1,2,3,4)

Of 540 cases of malignant lymphomas there were 457 cases (84.6%) of non-Hodgkin's lymphoma (NHL). These cases were analyzed by both Rappaport and Lukes-Collins classifications as shown in Table 1. There were only 13 cases (2.8%) of nodular lymphoma and the remainder were of diffuse type. The cases that showed only partial nodularity were also included in the nodular type. The well-differentiated lymphocytic type was encountered in 2 cases in this series. Poorly differentiated lymphocytic lymphoma was of nodular type in 2 cases and the remaining 128 cases were of diffuse type. Mixed lymphoma was encountered in 21 cases, among which 2 were nodular. The histiocytic type (Rappaport) was the most common type and was seen in 247 cases (54.1%). Nine of these were of nodular type. However, when these cases were categorized according to Lukes-Collins classification they consisted of 139 cases of large cleaved, 93 cases of large non-cleaved, 11 cases of B-immunoblastic sarcoma, 3 cases of T-immunoblastic sarcoma and only one case of true histiocytic type.

As far as T-cell lymphoma is concerned, we had 33 cases of lymphoblastic lymphoma (Rappaport), 3 of T-immunoblastic sarcoma and 5 of mycosis fungoides-Sezary syndrome. Twenty six of 33 cases of lymphoblastic lymphoma were of convoluted type and the remainder was of non-convoluted type. These 41 cases corresponded to approximately 8% of NHL cases. We have not encountered any

case of pleomorphic type adult T-cell lymphoma (ATL) of Japanese type (Suchi et al., 1979) in this material.

There were 7 cases of undifferentiated lymphoma and 12 cases of Burkitt lymphoma. The Burkitt lymphoma was seen in younger age group. Most of these lymphomas were found at extranodal site.

The age and sex distribution of NHL is summarized in Table 2. There were 309 males (67.6%) and 148 female (32.4%). All groups were almost equally affected. The ages ranged from 1 to 85 years with the mean age of 37 years. When the age group was matched with the histological type of NHL, as shown in Table 3, it was noted that the poorly differentiated lymphocytic type was not uncommon below the age of 20. And 27 out of 33 cases of lymphoblastic lymphoma occurred at ages below 20 years.

The anatomical site distribution of NHL is shown in Table 4. Fifty-three percent of NHL was extranodal judged by the biopsy site. The common sites were gastrointestinal tract, tonsil and oro-nasal cavity. Among 214 nodal lymphomas, cervical lymph nodes were the common site followed by inguinal and mesenteric lymph nodes.

### 2. Hodgkin's Disease (Tables 5,6,7,8)

Among the 540 cases of malignant lymphoma there were 83 cases (15.4%) of Hodgkin's disease (HD).

Eighty three cases of HD were subtyped according to Rye classification. The most common type was mixed cellularity, accounting for 47.0% of the cases, followed by nodular sclerosis (22.9%), lymphocyte depletion (15.7%) and lymphocyte predominance (14.5%). The lymphocyte depletion type here included cases of diffuse fibrosis type of the Lukes-Butler classification (Lukes and Butler, 1966) (Table 5).

The age and sex distribution of Hodgkin's disease is shown in Table 6. There was a definite male preponderance by 6.5:1. HD was commonly seen in the second, fifth and first decades. When we related histological types of HD to age group (Table 7) no particular tendency could be observed except that the lymphocyte depletion type affected comparatively older age groups.

The distribution of biopsy sites in HD is shown in Table 8. Among 83 cases of HD, 77 were of nodal type and six were of extranodal. This nodal predominance of HD was a contrast to NHL where the extranodal site was slightly more common. Among the lymph nodes affected the cervical node was the common site of HD.

**Table 1.** Comparison of Rappaport and Lukes-Collins classifications of non-Hodgkin's lymphoma in this series

	SL	PL	SC	LC	SNC	LNC	IBS-B	CL	S-MF	IBS-T	H	U	Total	(%)
NPDL			2										2	( 0.4)
NM			1	1									2	( 0.4)
NH				5		4							9	( 2.0)
DWDL	2												2	( 0.4)
DPDL		8	110					8				2	128	(28.0)
DM				19									19	( 4.2)
DH				134		89	11			3	1		238	(52.1)
LB								18				15	33	( 7.2)
BK					12								12	( 2.6)
UD					7								7	( 1.5)
U									5				5	( 1.1)
Total	2	8	113	159	19	93	11	26	5	3	1	17	457	
(%)	(0.4)	(1.8)	(24.7)	(34.8)	(4.2)	(20.4)	(2.4)	(5.7)	(1.1)	(0.7)	(0.2)	(3.7)		

NPDL: nodular poorly differentiated lymphocytic, NM: nodular mixed, NH: nodular histiocytic, DWDL: diffuse well-differentiated lymphocytic, DPDL: diffuse poorly differentiated lymphocytic, DM: diffuse mixed, DH: diffuse histiocytic, LB: lymphoblastic, BK: undifferentiated, Burkitt type, UD: undifferentiated, non-Burkitt type, U: unclassified, SL: small lymphocyte, PL: plasmacytoid lymphocyte, SC: small cleaved, LC: large cleaved, SNC: small noncleaved, LNC: large noncleaved, IBS: immunoblastic sarcoma, CL: convoluted lymphocyte, S-MF: Sezary-mycosis fungoides, H: histiocytic

**Table 2.** Age and sex distribution of non-Hodgkin's lymphoma

	Male	Female	Total (%)
0-10	19	13	32 ( 7.0)
11-20	33	12	45 ( 9.8)
21-30	33	19	52 (11.4)
31-40	54	19	73 (16.0)
41-50	59	35	94 (20.6)
51-60	45	25	70 (15.3)
61-70	57	17	74 (16.2)
71-80	9	7	16 ( 3.5)
81-90	0	1	1 ( 0.2)
Total	309	148	457
(%)	(67.6)	(32.4)	

**Table 3.** Age and types of non-Hodgkin's lymphoma

	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	Total
NPDL					1	1				2
NM					1	1				2
NH			2		3	1	3			9
DWDL				1		1				2
DPDL	6	13	13	22	29	18	22	4	1	128
DM		3	2	3	7	2	2			19
DH	5	14	30	40	51	43	44	11		238
LB	14	13	3	1		1	1			33
BK	6	1	1	2	1	1				12
UD	1	1	1	1		1	2			7
U				3	1			1		5
Total	32	45	52	73	94	70	74	16	1	457

NPDL: nodular poorly differentiated lymphocytic, NM: nodular mixed, NH: nodular histiocytic, DWDL: diffuse well-differentiated lymphocytic, DPDL: diffuse poorly differentiated lymphocytic, DM: diffuse mixed, DH: diffuse histiocytic, LB: lymphoblastic, BK: undifferentiated, Burkitt type, UD: undifferentiated, non-Burkitt type, U: unclassified.

**Table 4** Distribution of biopsy sites of non-Hodgkin's lymphoma

Nodal		Extranodal	
Cervical	138	Tonsil	53
Inguinal	27	GI tract	
Mesenteric	19	Stomach	36
Axillary	12	Small intestine	15
Mediastinal	5	Large intestine	14
Retroperitoneal	5	Nasal cavity	25
Epitrochlear	3	Oral cavity	24
Antecubital	1	Subcutaneous tissue	23
Preauricular	1	Skin	6
Femoral	1	Nasopharynx	16
Spleen	2	Larynx	4
		Brain	4
		Thyroid	3
		Spinal canal	2
		Testis	2
		Ovary	2
		Vagina	2
		Salivary gland	2
		Breast	2
		Urinary bladder	2
		Bone	2
		Conjunctiva	2
		Prostate	1
		Spermatic cord	1
<b>Total (%)</b>	<b>214 (46.8)</b>	<b>Total (%)</b>	<b>243 (53.2)</b>

**Table 5.** Histological types of Hodgkin's disease

Type	Number	%
Lymphocyte predominance	12	14.5
Nodular sclerosis	19	22.9
Mixed cellularity	39	47.0
Lymphocyte depletion	13	15.7
<b>Total</b>	<b>83</b>	<b>100.0</b>

**Table 6.** Age and sex distribution of Hodgkin's disease

Age group	Male	Female	Total (%)
0-10	11	1	12 (14.5)
11-20	16	2	18 (21.7)
21-30	8	3	11 (13.3)
31-40	10	1	11 (13.3)
41-50	14	1	15 (18.1)
51-60	7	1	8 ( 9.6)
61-70	4	1	5 ( 6.0)
71-80	2	1	3 ( 3.6)
<b>Total (%)</b>	<b>72 (86.7)</b>	<b>11 (13.3)</b>	<b>83</b>

**Table 7.** Age Distribution of Hodgkin's disease related to histologic type

	LP	NS	MC	LD	Total
0-10	2	2	8	0	12
11-20	4	7	7	0	18
21-30	0	5	5	1	11
31-40	2	1	5	3	11
41-50	2	2	6	5	15
51-60	1	1	5	1	8
61-70	1	1	2	1	5
71-80	0	0	1	2	3
Total	12	19	39	13	83

LP: Lymphocyte predominance  
MC: mixed cellularity

NS: nodular sclerosis  
LD: lymphocyte depletion

**Table 8.** Distribution of biopsy sites of Hodgkin's disease

Nodal	Extranodal
Cervical	Stomach
Axillary	Small intestine
Inguinal	Large intestine
Mediastinal	Subcutaneous tissue
Retroperitoneal	
Mesenteric	
Femoral	
Spleen	
Total (%)	

77 (92.8)

6 (7.2)

**Table 9.** Comparison of the distribution of malignant lymphomas by Lukes-Collins' classification in two series in Korea

Type	Jung et al (%)	Present series (%)
Convolutd lymphocytic	5.6	5.7
Sezary-mycosis fungoides	0.0	1.1
Small lymphocytic	0.0	0.4
Plasmacytoid lymphocytic	1.4	1.8
Follicular center cell	78.0	84.1
Small cleaved	22	24.7
Large cleaved	23	34.8
Small noncleaved	5	4.2
Large noncleaved	28	20.4
Immunoblastic sarcoma	9.0	3.1
Histiocytic	0.8	0.2
Unclassified	5.6	3.7

## DISCUSSION

In 1968 the first nationwide survey on malignant tumors in Korea was carried out by the Korean Society of Pathologists (Lee et al., 1968). Among 21,921

histologically proven cases of cancer, malignant lymphoma accounted for 5.2% (7.76% for males, 2.97% for females). At that time the lymphomas were divided only into lymphosarcoma, reticulum cell sarcoma and Hodgkin's disease. The stomach cancer was the most

common tumor among males (19.72%) and the uterine cervix carcinoma was the most common tumor in females (44.86%). The second most common tumor of males was liver cancer (8.16%), and the malignant lymphoma was the third most common tumor for combined sexes.

Although a similar nationwide study had not been conducted since that time, the Seoul National University Department of Pathology analyzed its own material in 1979 (Lee et al., 1979) and in 1987 (Lee et al., 1987). In these surveys malignant lymphoma accounted for 4.03% of 7,363 cases of malignant tumors diagnosed from 1968 through 1977 and 3.07% of 19,140 cancers from 1973 through 1986, respectively. For males the malignant lymphoma was 4.04% of all cancers and was the seventh most common cancer by relative frequency rank. According to Kim et al. (1973) of Yonsei Medical Center, malignant lymphoma accounted for 4.8% of all malignant tumors in Korea.

For information on histological subtype of malignant lymphoma in Korea there are only a few studies available. In addition to our studies (Lee et al., 1965; Shin et al., 1983a and b), Lee and Lee (1982) studied non-Hodgkin's lymphoma and Jung et al. (1982) analyzed 142 cases of non-Hodgkin's lymphoma according to Lukes-Collins classification. The results of the latter study are quite comparable to ours (Table 9).

On the basis of the assumption that the present series represents malignant lymphomas in Korea there seem to be several facts that characterize malignant lymphomas in Korea. First, Hodgkin's disease is definitely less common in Korea, its proportion of malignant lymphoma being approximately 10-15%. In most western countries it is between 35-50%. Recent data for U.S.A. (Kim et al., 1982) showed that HD constituted 34.8% of 8,915 cases of malignant lymphoma. Our figure is similar to that in Japanese studies. Tajima and Suchi (1980) reported 9.5% from analysis of the Japanese lymphoma registry, and Teijima and Watanabe (1979) reported an incidence of 12%.

Second, among cases of NHL the nodular (follicular) variety is relatively uncommon, i.e., 2.93% of NHL. This is also very low in comparison to other reports of western countries, in which it accounts for approximately half of NHL cases (Talvalkar et al., 1982). In Korea our previous data (Lee et al., 1965) and those of Lee et al. (1982) both showed an incidence of less than 6%. However, Jung et al. (1982) reported a 25.4% incidence, including 18.5% of partly nodular type. It still appears true that the follicular type is definitely less common among Koreans.

Third, the percentage of T-cell lymphoma judged by morphological observation appears to be approximately 10% in Korea. These cases are mostly of lymphoblastic lymphoma and Sezary-mycosis fungoides syndrome. At least one can say at this stage that pleomorphic adult T-cell lymphoma that is prevalent in certain sectors of Japan is not seen in any significant number in Korea. In regard to this, however, one has to make reservations until definitive data are available from epidemiological studies. Very recently there was a case report of a case of adult T-cell leukemia (Lee et al., 1987).

In regard to Hodgkin's disease we have no good explanation why we have more cases of mixed cellularity type and lymphocyte depletion type and less nodular sclerosis type compared to those of U.S.A. and most other countries except Japan. It seems, however, that the nodular sclerosis type determines the basic difference. In other words the small number of nodular sclerosis cases could also be the reason why we have a relatively small number of Hodgkin's disease.

In summary it appears that malignant lymphomas in Korea are characterized by rather high relative frequency among various malignant tumors, and diffuse non-Hodgkin's lymphoma predominates throughout all age groups, with male preponderance. Pleomorphic adult T-cell lymphoma is not seen in any significant numbers if not at all.

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